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## Internet GIS for historical regional statistics

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### Abstract

This article introduces an internet GIS for historical regional statistics developed by the Laboratory of Spatial Information Science, Doctoral Program in Geoenvironmental Sciences, University of Tsukuba. The paper discusses the objectives of this project, the available data, its scope and features, and some of the prospects and challenges as an online geospatial database facility of historical statistics of Japan since the Meiji period.

**Key words:** Internet GIS, Historical Statistics, Meiji Period, Spatial Information Science

### 1. Introduction

One of the most significant periods in the history of the Japan is the Meiji period where the country started a series of reforms that paved the way to dramatic changes in its socio-economic and political structure and further led it as one of the most developed nations today (Murayama and Watanabe, 2007). On this regard, as early as the Meiji period, various regional and country statistics were already part of the public administrative system (Watanabe et. al., 2008). These statistics were certainly essential at that time in monitoring the progress of the country and in charting future policy directions and development agenda. Since then, the national government as well as the local governments continued the production of statistical data and compiled these in book format.

Although these statistics were already more than a hundred years old, these have been made in digital format and compiled in a single geospatial database by Laboratory of Spatial Information Science (SIS), Doctoral Program in Geoenvironmental Sciences, University of Tsukuba under the auspices of the Japan Society for the Promotion of Science (Grants-in-Aid for Scientific Research). So called Administrative Boundary Digital Map after the Meiji Period, this project aimed at improving access to historical records which required enormous work processes to obtain statistical analysis; shorten the mapping process by using geographic information system (GIS) and creating historical maps; and eventually enhance the conduct of regional analysis. Ultimately, this project envisioned the

establishment of an internet GIS-based facility that would serve as repository of historical regional statistics dating back from the Meiji period.

### 2. Available Data

Taken from the most available official census and statistical archives of the government, the geospatial database compiled by the SIS Laboratory for this project basically consists of the spatial and statistical datasets in Table 1. These data were collected to visualize the Japanese modernization process during the recent hundred years.

### 3. Scope and Features

The datasets above not only include those from the Meiji period but also selected years during the Taisho and Showa period ([http://giswin.geo.tsukuba.ac.jp/teacher/murayama/datalist\\_e.htm](http://giswin.geo.tsukuba.ac.jp/teacher/murayama/datalist_e.htm)). To map out these datasets, currently, a WebGIS (Internet GIS) facility for historical statistics during the Meiji period dating back from 1878 to 1912 features some of the data mentioned above. This facility provides an interactive experience for online users to create their own historical maps featuring their selected data. It has the capability to produce choropleth maps based from quantile or equal interval distribution and can be divided up to ten classes shown in the left part in Fig. 1. It also has zoom in, zoom out and pan control features. Data that can be mapped online using this facility include population characteristics, employment status, animal possession, transportation vessels, public infrastructure, among others. Data cover the whole of Japan but disaggregated up to prefectural level only.

To further showcase the potential of GIS to map historical statistics using the abovementioned datasets, hundreds of regional maps were created with GIS displaying the spatial characteristics concerning the socio-economic and demographic dimensions of five regions in Japan, namely, Kanto, Kinki, Hokuriku, Chubu and Tohoku, all located in Honshu Island (Fig. 2). Instead of a prefecture, maps were created at a finer disaggregation – the city, town and village level – based from the old administrative boundary of the Meiji period. Most of these generated regional historical maps exhibit common information features: population characteristics; distribution of warehouses and horse barns; presence of temples, schools, hospitals; existence of manufacturing industries, water mills, ships and small

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Table 1 Available data.

I. Spatial Datasets	Date	Disaggregation	Scope	Format
Early Showa Era Administrative Boundary Data	1930s	city, town, village	whole country	.shp (ESRI shape file)
Meiji Era Administrative Boundary Data	1891	city, town, village	portion of the country	.shp
Changes in Administrative Boundary Database (Tabular format)	1889-2006	village, chome	whole country	.xls (Excel file)
Changes in Administrative Boundary Database (Map format)	1889-2006	city, town, village	whole country	.shp
II. Statistical Datasets	Date	Disaggregation	Scope	Format
Nationwide Population Statistics	1872-1886	city, prefecture	-same-	.xls
Military Affairs Requisition List	1880-1907	city, town, village	-same-	.xls
Japanese Empire Population Movement Statistics	1900	prefecture	-same-	.xls
Ship Database in Meiji Era	1886-1887	prefecture	-same-	.xls
Census Data	1920/1930	city, town, village	-same-	.xls
Causes of Death Statistics	1920	prefecture	-same-	.xls
Major Transportation and Freight Statistics	1924	prefecture	-same-	.xls

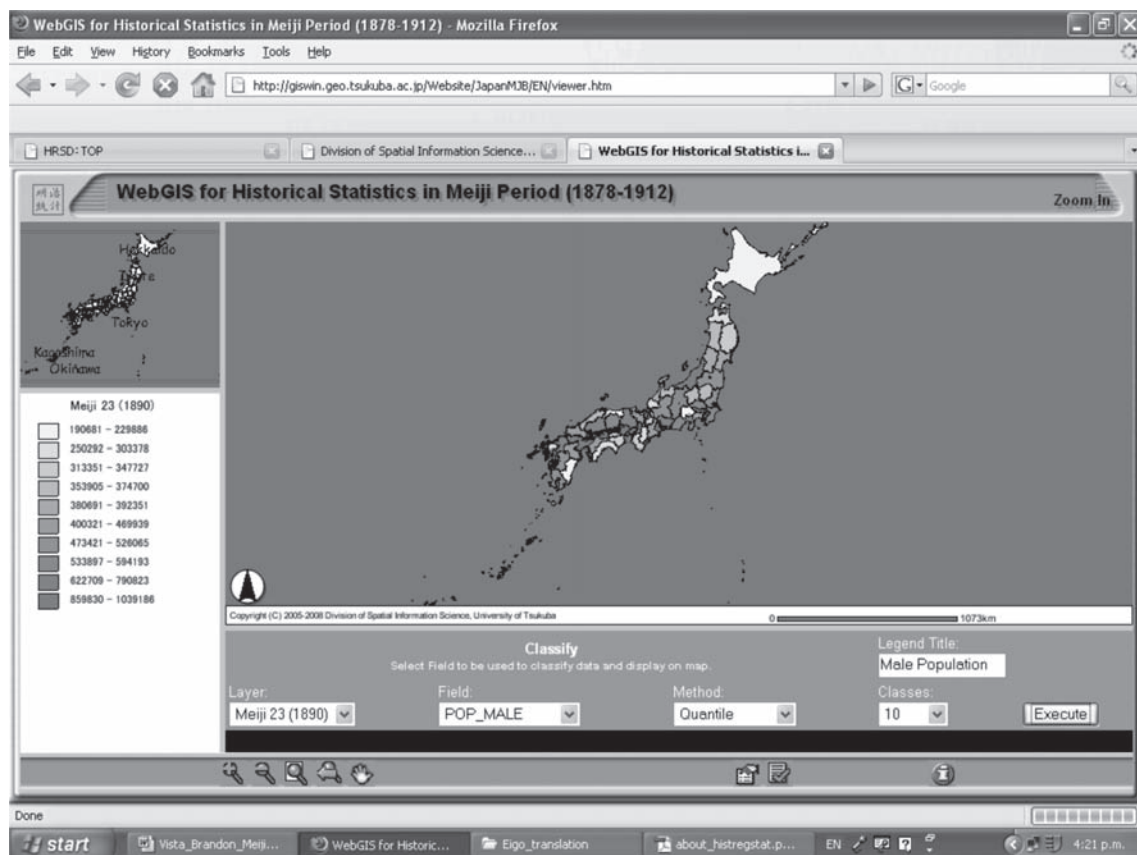


Fig. 1 WebGIS for historical statistics in Meiji period.  
(Source: <http://giswin.geo.tsukuba.ac.jp/Website/JapanMJB/EN/viewer.htm>)

vessels; distribution of cows and horses; different types of transportation vehicles; and agricultural production. All of these maps can be freely downloaded (for a complete list of these maps by region).

Aside from these regional-based generated maps,

prefectural-level statistics were also mapped with GIS, also by city, town and village level. Ibaraki Prefecture served as the pilot site in this case with more than 500 different types of statistical datasets from the Prefectural Statistics Book during the Meiji period. These prefectural



Fig. 2 Historical regional statistics webpage.  
(Source: [http://giswin.geo.tsukuba.ac.jp/teacher/murayama/slide\\_e.html](http://giswin.geo.tsukuba.ac.jp/teacher/murayama/slide_e.html))

maps portray voluminous information which includes population, land valuation and taxation, migration, social class, agricultural production, public health, education, religion, ammunitions data, among others.

Furthermore, the historical regional statistics GIS project also established a downloading facility suitable for students, researchers, and anyone interested, free of charge. All of the spatial boundary datasets and statistical datasets mentioned above could be downloaded using this facility. In order to have an access to these data, interested parties must register their names, affiliation and purpose. A password will be issued and sent to the email's applicant before one can login.

#### 4. Prospects and Challenges

The digitalization of historical statistics including old administrative boundaries, as successfully did by this project, offers a volume of data that opens the possibility in generating innovative geographical knowledge and information not otherwise possible before. By downloading these geospatial datasets and subsequently manipulating them using GIS, one can produce various historical maps that could provide a deeper knowledge of

the spatial patterns and spatial trends on socio-economic condition of the past; and subsequently, employ various statistical methodologies to enhance spatial and regional analysis.

However, the accuracy, consistency and completeness of these datasets, especially the historical statistical records, are indispensable on this regard. Moreover, its dissemination to the wider audience, especially to Japanese geographers and interested researchers is crucial to the project in order to for them patronize the GIS facility and the data it offers. Nonetheless, this kind of online facility is already a step further to preserve the major geo-statistical records since the Meiji period; and undoubtedly, facilitates the advancement of knowledge and research in historical and quantitative geography in Japan.

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